Accelerator Systems Division Highlights Ending June 3, 2005

Installation

Craft Snapshot 5/31/05

ASD productive craft workers	**63.0**
Foremen (Pd by 15% OH)	7.0
AMSI management (Pd directly)	3.0
TOTAL AMSI WORKERS	76.0
Less WBS 1.9, 1.2 etc	**12.0**
Less absent	**4.0**
TOTAL PD BY ASD/ORNL DB WPs	**47.0**

Accelerator Physics

- Barrier RF systems are under study for the Beam Power Upgrade as a way to improve the bunch factor. Methods of momentum painting are under study for obtaining self-consistent beam distributions.
- The PASTA program for performing phase scans has been modified to work for the SCL so that RF phase and amplitude setpoints can be determined based on the phase difference between downstream BPMs
- An Energy Management program is being developed to design an SCL lattice based on available cavities and field limits in those cavities.
- Magnets for the LDRD laser-stripping experiment have arrived. The beamline is being prepared for their installation.

Operations

- Continued Operations support for testing Superconducting RF during nights and weekends
- Attended the 2005 Workshop on Accelerator Operations at Fermilab, where SNS Operations personnel gave 3 presentations
  - Maintenance Management Systems
  - Control Room Design
  - Recruitment and Training of Operators
- Worked with the PPS Team to refine the PPS Phase 2 (Linac and HEBT) requirements
- Completed the overhaul of the SNS Safety Assessment Document (SAD) chapter dealing with the Accelerator Safety Envelope - to be included in the imminent revision of the SAD

Ion Source

- Work continues to match the external antenna source to our 2 MHz amplifier.
- A statistical analysis of the last lifetime test showed an average current of 33.3 mA during the 16.4 days the current exceeded 30 mA. During 24 hour periods the current varied by only 1.0 % (1 sigma).

Survey and Alignment

SCL:
WSR21 Re-aligned.
WSR22 Re-aligned.
WSR12 laser box re-aligned.
CM11 laser pipe aligned.
CM12 laser pipe aligned.
HEDPS base plates set for grout.
CM23 dummy section aligned.
Continuing work on re-alignment of laser transfer line and boxes.
HEBT:
HEBT dump quads QH01, QV02, and QV03 re-aligned.
RING:
Calculations underway for the global positioning of the Lambertson and RTBT Dipole..
Magnet Measurement:
21Q40_57 fiducialized.
21Q40_53 optically set.
21Q40_53 fiducialized.
21Q44_44/DCV035 Coupled.
21Q40_58 optically set.

Mechanical

Magnets

- Finished two more RTBT 21Q40 assemblies
- Mapped another 21Q40

Water Systems Installation

- Installation of the Ring Injection magnets' cooling connections continued.
- Installation of the Ring Collimators' remote cooling connections continued.
- Fabrication of the RTBT Collimators' Closed loop System continued.
- Modification of the RFTF Klystron cooling system to accommodate the new Thales 2.5 MW klystron continued.
- Preventative Maintenance on the Linac water systems continued

Ring Systems Installation

- The HEBT 12Q45 magnet QH10 was successfully tested.
- The HEBT Linac dump line magnets were aligned to their final positions.
- The HEBT Labyrinth Shield fire prevention air dampers were received.
- The RTBT 21Q40 magnet QV11 was installed.
- The RTBT beam pipe and diagnostic support stands were assembled

Electrical

- Upgrades of the SCR Controller fast overcurrent protection circuitry continued this week. Testing of the new fuses in the DTL-Mod5 modulator at full average power was successful. Much of the remainder of the week was spent preparing for the weekend SCL run and processing oil in some of the modulator tanks.
- Completed all Ring Arc magnet terminations
- Pulled AC cables for Main Ring Power Supply
- Ring Straight section magnet terminations in progress
- Installing newly scoped cables in Linac and HEBT
- Installed ac power for recovery compressor in CHL

HPRF

- Replaced Thales 550kW klystron in SCL 17B with spare. Original tube had low output power.
- RFTF water cooling was modified to permit Thales 2.5 MW tube installation for acceptance testing.

Ring RF

- Electricians have been scheduled to complete the remaining Ring RF System Tunnel wiring.

LLRF

- The technicians are executing a punch list of "clean-up" tasks in the Linac LLRF installation, preparing for the handover (next week) of the LLRF systems for cryomodule 22, and are building out spare Field Control Modules.
- A good short to medium term solution has been found to mitigate the problem of radiation damage to the fiber optic arc detection cables in the SCL. Excess cable is being pulled up the chases to minimize the amount of cable subject to irradiation, and replaceable jumpers will be installed between the cryomodules and the chases in problem areas. The jumpers will be plastic optical fiber as used at the APS. They are much more radiation resistant compared to the cables already installed, as evidenced by controlled irradiation measurements at ORNL.
- The larger-than-expected phase push in the SCL RF systems is reducing our control margin. We will solve this problem by implementing a gain rotation table that will provide for the correct loop phase throughout the RF pulse. Larry Doolittle will be here next week to assist with this effort.
- We are spending time in the control room executing tests and studies of the SCL LLRF control systems.

Cryo Systems

- Testing of superconducting cavities and cryomodules continued over the long weekend.
- CM2 and 21 were brought up to power, the couplers conditioned, cavity fields calibrated and the limits found. A total of 73 cavities have been tested so far.
- Thirty cavities at a time were turned on to determine the heat load on the cryogenics system and left running for one day each set.
- Since there was only one second stage compressor running the cavities were set at fields of about 60% of the maximum fields and the system was stable at 10 pps repetition rate.
- CM22 back

Controls

- The group initiated its all-system "scorecard" routine leading up to the July ARR. The MPS scorecard was reported at the Friday installation meeting. Much has been accomplished – much remains to be done.
- Mario Giannella gave a well-received talk on the SNS Central Control Room at the Workshop on Accelerator Operations.
- Improvements were made to the SSC LLRF systems to improve closed loop performance.
- Test procedures have been completed for cryomodules 2 through 21 and their associated warm sections. Completion of this testing was required in order to support the SCL valve opening test this weekend. The CPLD code for the fast valve controller was modified to support this week's test.
- Test plans for Linac Dump Thermocouples and Collimator Water Skids have been reviewed and updated to show the latest information. The test plan for Scraper Foils (motion control) has been reviewed and updating is underway – should finish next week.
- Motion control racks from BNL have been set in place. The HEBT motion control rack has power applied to it.
- The first target controls IOC is running and showing readouts from the PLCs. There is some cleanup required for PV names on a number of screens. The goal is to be in a position to use the EPICS screens to help with hardware checkout.
- Improved screens have been developed for the PPS, and new ones for the HEBT PPS. A software specification has been developed for the Target PPS (TPPS). Installation of the TPPS is proceeding in the target building. PPS field devices have been installed in the transfer service bay and basement utility vault area. PPS cable installation in the target building was disrupted when it was discovered that non-PPS cabling had been installed in PPS tray. Also, some PPS tray sections did not have the required divider installed in the tray. The XFD installation coordinator has been apprised of the situation. The tray has been walked down by PSSO and a corrective action list has been generated. The sub-contractor will install missing divider sections and move cable out of the PPS section. In some areas, new tray will be installed.
- Some tests have been conducted on the possibility of using "LDAP" as an EPICS directory structure. Searches written in "C" code are promising - a lookup of >1600 names per second appears possible.

Beam Diagnostics